

L-BAND SPDT SWITCH

DESCRIPTION

The μPG2010TB is GaAs MMIC for L-band SPDT (Single Pole Double Throw) switch which were developed for mobile phone and another L-band application.

This device can operate frequency from 0.5 to 2.5 GHz, having the low insertion loss and high isolation.

This device is housed in a 6-pin super minimold package. And this package is able to high-density surface mounting.

FEATURES

- Supply voltage : $V_{DD} = 2.7$ to 3.0 V (2.8 V TYP.)
- Switch control voltage : $V_{cont(H)} = 2.7$ to 3.0 V (2.8 V TYP.)
: $V_{cont(L)} = -0.2$ to $+0.2$ V (0 V TYP.)
- Low insertion loss : $L_{INS1} = 0.25$ dB TYP. @ $f = 0.5$ to 1.0 GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
: $L_{INS2} = 0.30$ dB TYP. @ $f = 2.0$ GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
: $L_{INS3} = 0.35$ dB TYP. @ $f = 2.5$ GHz, $V_{DD} = 2.8$ V,
: $V_{cont} = 2.8$ V/0 V (Reference value)
- High isolation : $ISL1 = 28$ dB TYP. @ $f = 0.5$ to 2.0 GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
: $ISL2 = 25$ dB TYP. @ $f = 2.5$ GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V (Reference value)
- High power : $P_{in(0.1\text{ dB})} = +33.0$ dBm TYP. @ $f = 1.0$ GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
- High-density surface mounting : 6-pin super minimold package ($2.0 \times 1.25 \times 0.9$ mm)

APPLICATIONS

- L-band digital cellular or cordless telephone
- PCS, W-LAN, WLL and Bluetooth™ etc.

ORDERING INFORMATION

| Part Number | Package | Marking | Supplying Form |
|--------------|----------------------|---------|---|
| μPG2010TB-E3 | 6-pin super minimold | G2Y | <ul style="list-style-type: none"> • Embossed tape 8 mm wide • Pin 1, 2, 3 face the perforation side of the tape • Qty 3 kpcs/reel |

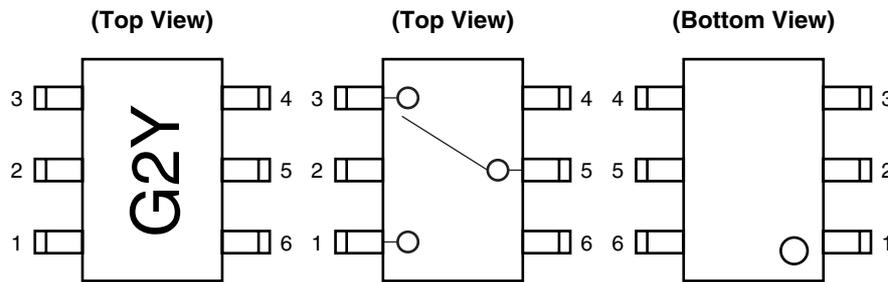
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μPG2010TB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



| Pin No. | Pin Name |
|---------|-------------------|
| 1 | OUTPUT1 |
| 2 | GND |
| 3 | OUTPUT2 |
| 4 | V _{cont} |
| 5 | INPUT |
| 6 | V _{DD} |

TRUTH TABLE

| V _{cont} | INPUT-OUTPUT1 | INPUT-OUTPUT2 |
|-------------------|---------------|---------------|
| Low | ON | OFF |
| High | OFF | ON |

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|-------------------|---------------------|------|
| Supply Voltage | V _{DD} | 6.0 | V |
| Switch Control Voltage | V _{cont} | 6.0 | V |
| Input Power | P _{in} | +36 | dBm |
| Power Dissipation | P _D | 150 ^{Note} | mW |
| Operating Ambient Temperature | T _A | -45 to +85 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|----------------------------|-----------------------|------|------|------|------|
| Supply Voltage | V _{DD} | 2.7 | 2.8 | 3.0 | V |
| Switch Control Voltage (H) | V _{cont (H)} | 2.7 | 2.8 | 3.0 | V |
| Switch Control Voltage (L) | V _{cont (L)} | -0.2 | 0 | 0.2 | V |

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|---|--------------------------|--|-------|-------|------|------|
| Insertion Loss 1 | L _{INS1} | f = 0.5 to 1.0 GHz | – | 0.25 | 0.45 | dB |
| Insertion Loss 2 | L _{INS2} | f = 2.0 GHz | – | 0.30 | 0.50 | dB |
| Isolation 1 | ISL1 | f = 0.5 to 2.0 GHz | 24 | 28 | – | dB |
| Input Return Loss | RL _{in} | f = 0.5 to 2.5 GHz | 15 | 20 | – | dB |
| Output Return Loss | RL _{out} | f = 0.5 to 2.5 GHz | 15 | 20 | – | dB |
| 0.1 dB Gain Compression Input Power ^{Note} | P _{in (0.1 dB)} | f = 1.0 GHz | +31.5 | +33.0 | – | dBm |
| 2nd Harmonics | 2f ₀ | f = 1.0 GHz, P _{in} = +30.5 dBm | 65 | 75 | – | dBc |
| 3rd Harmonics | 3f ₀ | f = 1.0 GHz, P _{in} = +30.5 dBm | 65 | 75 | – | dBc |
| Supply Current | I _{DD} | | – | 50 | 100 | μA |
| Switch Control Current | I _{cont} | | – | 4 | 20 | μA |

Note P_{in (0.1 dB)} is measured the input power level when the insertion loss increases more 0.1 dB than that of linear range.

STANDARD CHARACTERISTICS FOR REFERENCE

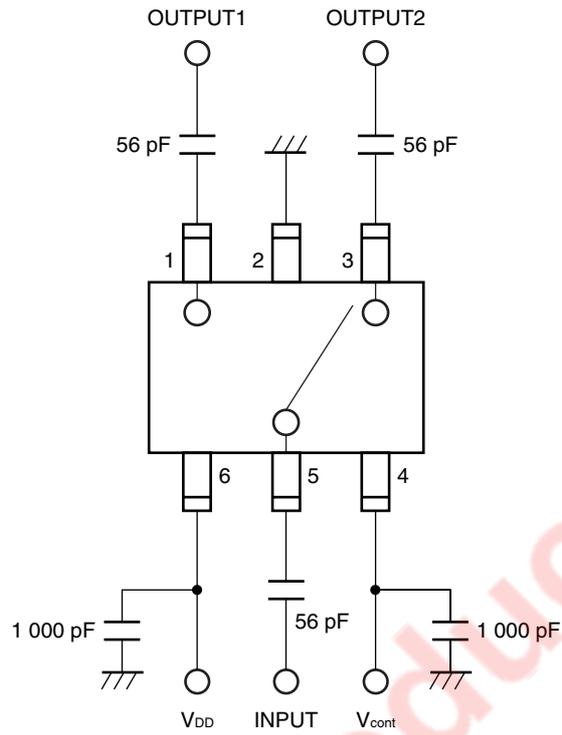
(T_A = +25°C, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|----------------------|-------------------|-----------------|------|------|------|------|
| Insertion Loss 3 | L _{INS3} | f = 2.5 GHz | – | 0.35 | – | dB |
| Isolation 2 | ISL2 | f = 2.5 GHz | – | 25 | – | dB |
| Switch Control Speed | t _{sw} | | – | 1 | – | μs |

Caution This device is used it is necessary to use DC cut capacitors.

The value of DC cut capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC cut capacitor value is less than 100 pF.

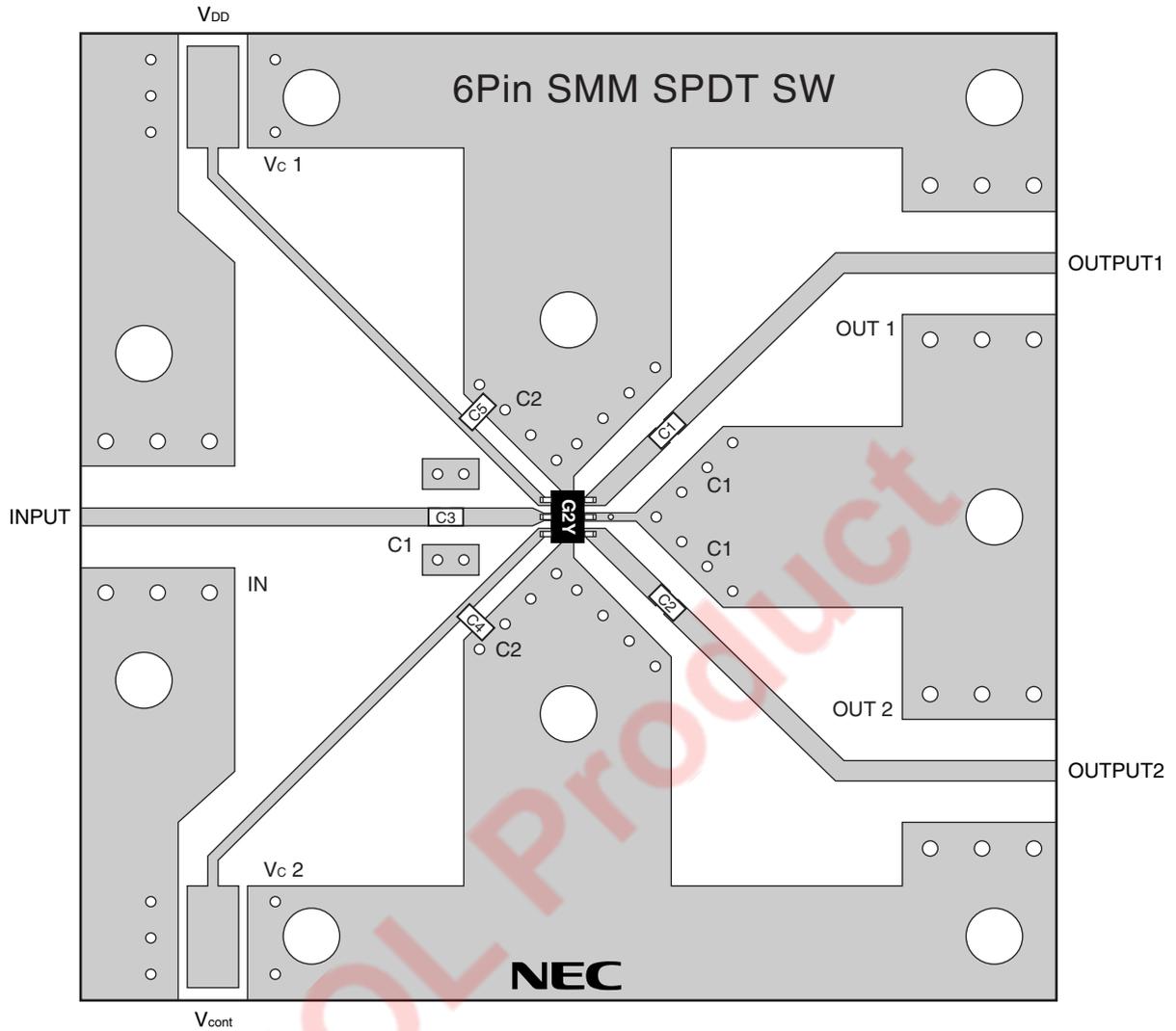
EVALUATION CIRCUIT ($V_{DD} = 2.8\text{ V}$, $V_{cont} = 2.8\text{ V}/0\text{ V}$, DC cut capacitors = 56 pF)



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

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ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

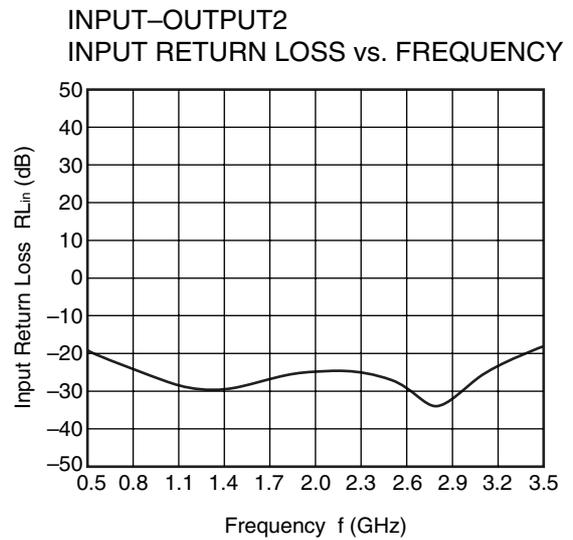
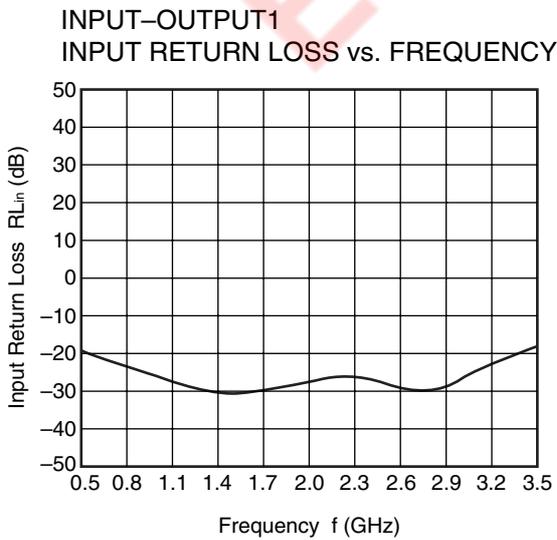
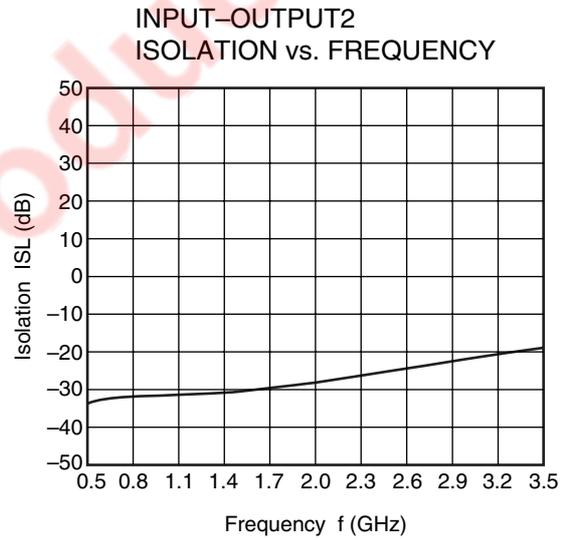
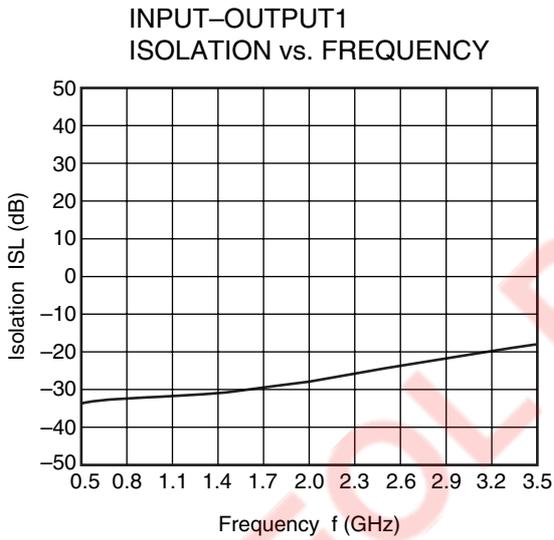
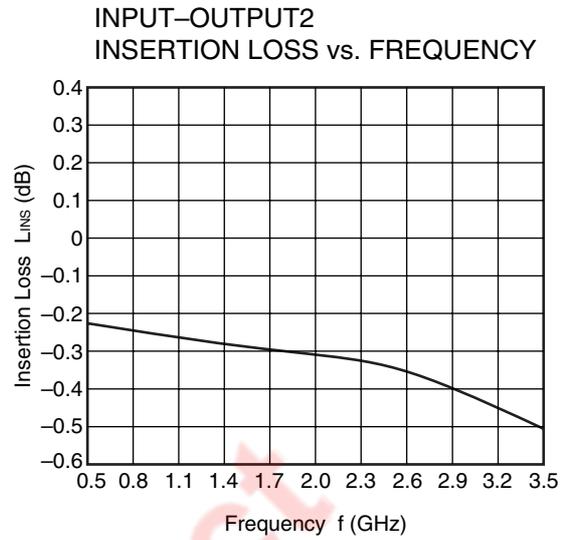
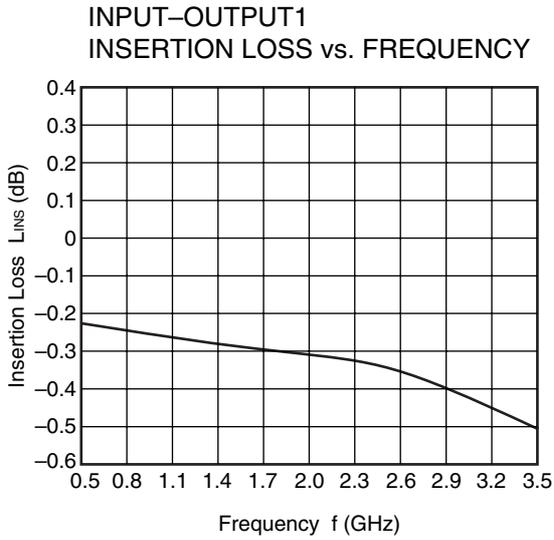


USING THE NEC EVALUATION BOARD

| Symbol | Values |
|------------|----------|
| C1, C2, C3 | 56 pF |
| C4, C5 | 1 000 pF |

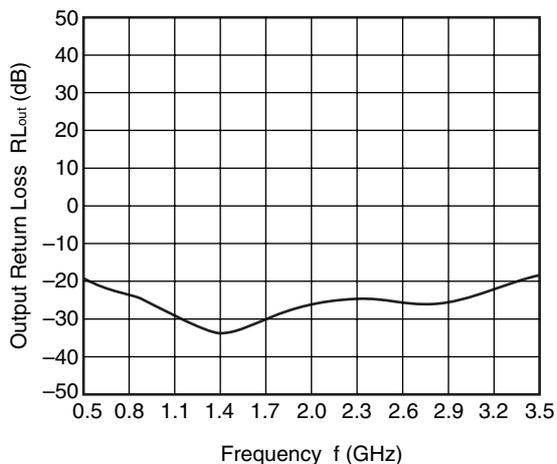
★ TYPICAL CHARACTERISTICS

($T_A = +25^\circ\text{C}$, $V_{DD} = 2.8\text{ V}$, $V_{cont} = 2.8\text{ V/0 V}$, DC cut capacitors = 56 pF, unless otherwise specified)

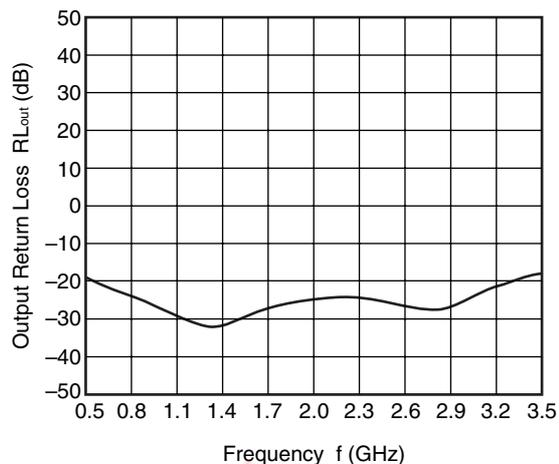


Remark The graphs indicate nominal characteristics.

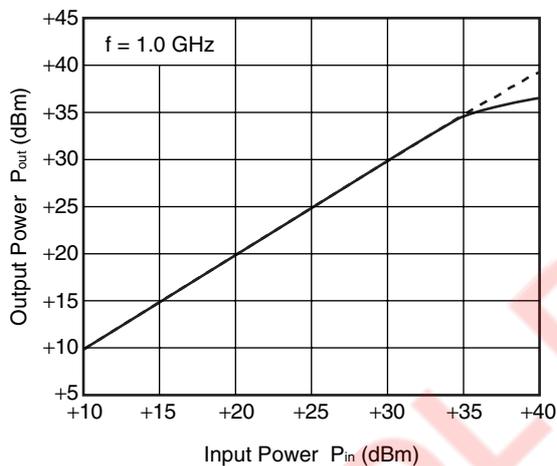
INPUT-OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY



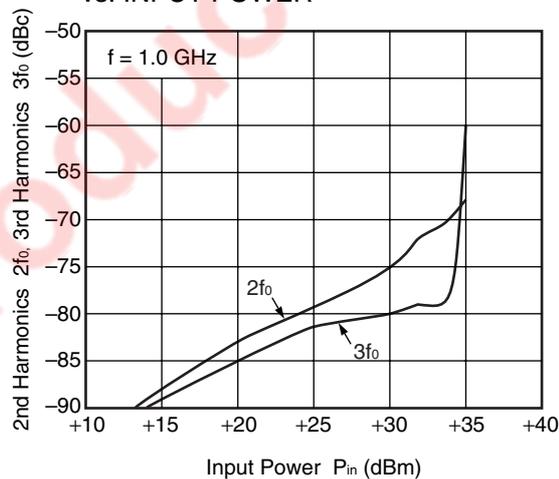
INPUT-OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



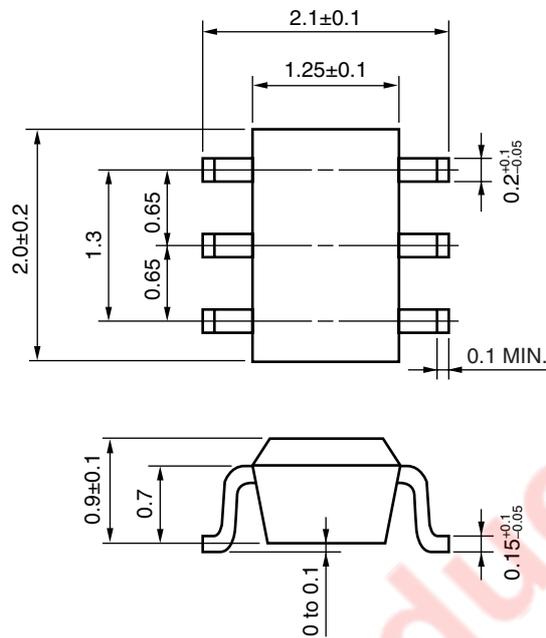
2ND HARMONICS, 3RD HARMONICS
vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPTER MINIMOLD (UNIT: mm)



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RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|------------------|
| Infrared Reflow | Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260 |
| VPS | Peak temperature (package surface temperature) : 215°C or below Time at temperature of 200°C or higher : 25 to 40 seconds Preheating time at 120 to 150°C : 30 to 60 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | VP215 |
| Wave Soldering | Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (pin temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | HS350 |

Caution Do not use different soldering methods together (except for partial heating).

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M8E 00.4-0110

| | | |
|-----------------------|----------------------|---|
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|-----------------------|----------------------|---|

EOL Product

► For further information, please contact

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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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